

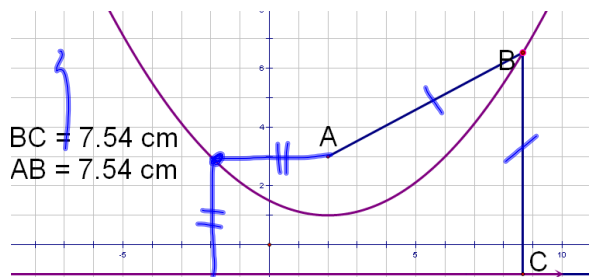
8-2 Parabolas

Conic Sections--figure that can be obtained by slicing a double cone

p419



Parabola--set of all points in a plane that are the same distance from a given point (focus) and a given line (directrix)



Equation of a Parabola

$$y = a(x - h)^2 + k$$

V(h, k)

+a opens up

-a opens down

axis x = h

Distance between vertex and focus

Distance between vertex and directrix

$$\left| \frac{1}{4a} \right|$$

Latus rectum--The segment that goes through the focus and is perpendicular to the axis of symmetry

$$\text{Length} = \left| \frac{1}{a} \right|$$

$$\text{Distance between endpoints and the focus} = \left| \frac{1}{2a} \right|$$

gsp

Example 1:

$$y = \frac{1}{16}(x - 2)^2 + 3$$

$$V(2, 3)$$

$$\text{a.o.s } x = 2$$

$$a = \frac{1}{16}$$

$$\left| \frac{1}{4a} \right| = 4$$

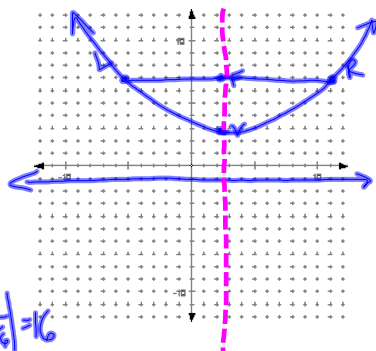
$$F(2, 7)$$

$$D: y = -1$$

$$LR = \left| \frac{1}{a} \right| = 16$$

$$L(-6, 7)$$

$$R(10, 7)$$



Example 2:

$$4(y + 9) = (x + 6)^2$$

$$y + 9 = \frac{1}{4}(x + 6)^2$$

$$y = \frac{1}{4}(x + 6)^2 - 9$$

$$V(-6, -9)$$

$$\text{a.o.s } x = -6$$

$$\left| \frac{1}{4a} \right| = 1$$

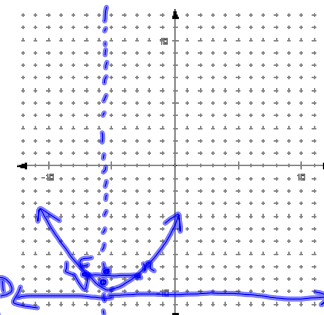
$$F(-6, -8)$$

$$D: y = -10$$

$$LR = \left| \frac{1}{a} \right| = 4$$

$$L(-8, -8)$$

$$R(-4, -8)$$



Equation of a Parabola

$$x = a(y - k)^2 + h$$

 $V(h, k)$

+a opens right

-a opens left

a.o.s. $y = k$

Distance between vertex and focus

Distance between vertex and directrix

Latus rectum--The segment that goes through the focus and is perpendicular to the axis of symmetry

Length = $\left| \frac{1}{a} \right|$ Distance between endpoints and the focus = $\left| \frac{1}{2a} \right|$

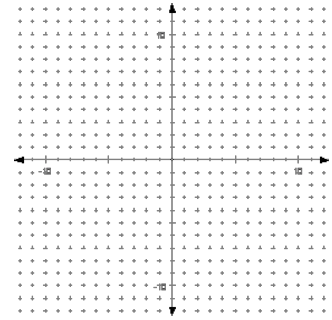
Example 2:

$$x = -\frac{1}{12}(y - 5)^2 - 2$$

opens left

 $V(-2, 5)$ a.o.s. $y = 5$

$$\left| \frac{1}{4(-\frac{1}{12})} \right| = 3$$

 $F(-9, 5)$ 

HW

p423-424

5, 18, 23

Attachments

parabola_sketch.gsp